

group the ♂ perianth is 3-lobed and the lobes alternate with as many stamens; in the other group, the ♂ perianth is 5-lobed and the stamens tend to be numerous. The styler structure of the genus is variable throughout. Some species have evolute columns with divaricate stigmas (see, for instance, *T. Sellowiana* Muell. Arg. and *T. leucandra* Pax & Hoffm.). Others, on the contrary, have branches of the style that become divergent at the very top of the ovary (see, for instance, *T. geraniifolia* Baill. and *T. mitis* Hochst.). The stigmatic surfaces are more or less thickly and finely papillose. The stamens are more or less elongated, sometimes mixed with staminodes, but so far as I know the anthers bear no appendage arising from an extension of the connective between the cells, and the filaments are almost always delicate.

Like the majority of the genera of the Euphorbiaceae, *Tragia* is a natural group, covering species that are unlike in their morphology and, even more, in their tendencies. Such a group is essentially defined by negative characters and cannot be broken up at will into lesser units merely because some of its forms happen to have characters in their flowers that do not exactly fit the standard generic definition. *Tragia* is a phylogenetic node from which have radiated forms that ultimately have evolved along lines of their own. One of such lines, for instance, can readily be identified. It begins with the coarsely papillose and thick style of certain species of *Tragia*, and through *Cnesmone* it ends in *Plukenetia*, the styler structures becoming larger and more deeply and intimately connate as the evolutive trend unfolds itself.

The earliest segregate from *Tragia* recorded in the botany of tropical Asia is *Cnesmone*. In publishing it as *Cnesmosa* (Bijdr. 12: 630. 1825, corrected to *Cnesmone* in Blume & Fischer, Fl. Jav. 1: vi *in nota*. 1828¹), Blume laid stress upon the following: "Genus a *Tragia* diversum calice in femineis 3-sepalo, stigmatibus sessilibus carnosus intus verrucosis ut etiam habitu". None of the characters emphasized by Blume can validly separate *Cnesmone* from *Tragia*. The *species lectotypica proposita* of *Tragia* is *T. volubilis* L., which has a 3-lobed ♂ calyx and a 6-lobed ♀ perianth, this type of flower being also characteristic of certain species of *Cnesmone*. As has been pointed out, "stigmatibus sessilibus carnosus intus verrucosis" occur on *T. geraniifolia*. The habit,

¹This reference is usually cited, following Pax & Hoffmann, *op. cit.*, 102, as "Fl. Jav. praef. VI. (1828)," which is misleading. The introduction to the *Flora Javanica* referred to as "praef." is an integral part of the first volume of this work, paged in Roman numerals. Many important corrections are effected by Blume in this introduction. *Cnesmosa* is a "clearly unintentional orthographic error" under Art. 70 of the Rules of Nomenclature, which Blume was justified in correcting. *Cnesmone* alludes to the urent hairs of the type-species, *C. javanica*, as pointed out by Pax & Hoffmann, *op. cit.*, 102 *in nota*.

of course, is very much alike in the genera of the PLUKENETIINAE, and *Cnesmone* quite agrees with the gross morphology of *Tragia*.

The fundamental difference between *Cnesmone* and *Tragia* is that of the anthers, which bear a manifest connective between the cells in *Cnesmone* and are exappendiculate, on the contrary, in *Tragia*. This difference, overlooked by Blume, is emphasized by Pax & Hoffmann in their key to the genera of the PLUKENETIINAE, in which they (op. cit., 9) say of *Tragia*: "Stamina numerosa vel plura, saepius autem 3. Ovarium 3-loculare; styli superne liberi" and refer to *Cnesmone* as having: "Stamina normaliter 3 vel 2. Ovarium 3-loculare. Antherae appendiculatae. Styli superne liberi." Mueller Argoviensis, on his part (in DC. Prodr. 15[2]: 926. 1866), states that *Cnesmone* is "Planta fruticosa, scandens, habitu Tragiae, in Java et India orientali crescens, connectivi et stylorum indole insignita." This characterization of Blume's genus is correct, in the main. Unfortunately, it has often been read to mean that the thickened style of *Cnesmone* has generic importance. This is not necessarily true, because the stigma of *C. javanica* is essentially free, and as such is correctly illustrated by Pax & Hoffmann (op. cit., 103 fig. 23 E).

In his publication of *Cenesmon*, Gagnepain (in Bull. Soc. Bot. France 71: 865-866. 1924) notices that this genus differs from *Tragia* because it has appendaged anthers with spreading cells, coarse and conical papillae on the stigmas and no stylar column. He furthermore states that *Cenesmon* is unlike *Cnesmone* because it has stigmas that spread in anthesis, conical stigmatic papillae and no stylar column. It is to be feared that in emphasizing differences such as these, Gagnepain relies too much on characters of the flower that are unimportant in the Euphorbiaceae. Since in *Tragia* a stylar column may be present or absent, and the stigmas may be finely or coarsely papillate, no reliance can be put upon the nature of the stylar column and of the stigma to effect generic segregations in this group. Shorn of unessentials, Gagnepain's notes amount merely to this: *Cenesmon* is generically distinct from *Tragia* because it bears appendaged anthers, and it differs from *Cnesmone* in having stigmas that spread at the time of anthesis.

The fact that the stigmas tend to be inflexed rather than to expand has absolutely no systematic significance in the PLUKENETIINAE. In this tribe, the style varies a great deal in the different stages of its growth, which is proved by van Steenis' illustration of the style of *Clavistylus peltatus* J. J. Sm. The two states which van Steenis (in Bull. Jard. Bot. Buitenz. iii, 12: 201, fig. 10 d, e. 1932) shows are so different that taxonomists of the school of Gagnepain would hesitate in believing them to

be conspecific and perhaps even congeneric. At the very best, fully accepting the accuracy of Gagnepain's observations, *Cenesmon* could be maintained as a subsection of *Cnesmone* to include the species that have about reached a stage of evolution wherein their style *begins to look like* the style of certain species of *Tragia*. There can be no question of erecting two genera because the stigmas spread or fail to do so.

Cnesmone, as has been shown, differs from *Tragia* because it has appendaged anthers. Characteristically, *Cenesmon* is said by Gagnepain to differ from *Tragia* in the very same manner, that is to say, in carrying anthers that are appendaged. It is but a logical conclusion that *Cenesmon* is a synonym of *Cnesmone*, because none of the differences which are said to separate them has any value. It might be possible to treat *Cnesmone* as a subgenus of *Tragia*, denying generic validity to the presence or absence of the appendage in the anthers. Such a treatment, however, is neither necessary nor correct. *Cnesmone* is a good genus not because its anthers differ in some detail from those of *Tragia*. It is a good genus because it consists of species that are phylogenetically, phytogeographically and morphologically one unit, and form as such a natural group in the flora of eastern tropical Asia. It is conceivable that some of the species of *Cnesmone* may have anthers that are less manifestly appendaged than those of others, and that their position under *Cnesmone* may ultimately depend upon sums of intangibles rather than upon technicalities of floral morphology. Such technicalities have a very limited value in the Euphorbiaceae; were they stressed, every one of the fundamental genera of the family could be broken up into countless meaningless segregates.

I have not seen material of *Sphaerostylis Tulasneana* Baill. The classic illustrations of this species, prepared under the supervision of Baillon (Etud. Gén. Euphorb., *pl.* 21, *fig.* 19–21. 1858; in Grandidier, Hist. Madagascar 4[xxix]: *pl.* 196. 1890) are fortunately very clear. In view of what they show it is safe to conclude that *Tragiella* Pax & Hoffm. is merely a synonym of *Sphaerostylis*. The lobes of the ♀ calyx are manifestly pinnatifid in *Tragiella*, but they are at least toothed in *Sphaerostylis*. The peculiar coarctate ♂ perianth of the former is described by Pax & Hoffmann (op. cit., 104) as: "Calyx ♂ valvatim 3-partitus, parte inferiore campanulatus, ad faucem introrsum plicatus, lobi deinde patentés." The perianth of *Sphaerostylis* likewise is characterized by the two authors (op. cit., 106) as: "Calyx ♂ ultra medium valvatim partitus; lobi demum transversim introsum plicati, quasi discum simulantes." The lobes of the ♀ perianth are about 6 in both genera. The style of *Tragiella* is described as: "Styli in columnam infun-

dibuliformem, apice trilobam, vel in massam globosam connati," and that of *Sphaerostylis* as: "Styli in massam globosam, longitrorsum trisulcam, ovario multo majorem connati, summo apice brevissime liberi." The differences in the stamens of the two genera are just as trifling as are those in the styles. In *Tragiella* the stamens are described as: "Stamina 3-4, alternisepala; filamenta brevia, basi incrassata et hic inter se connata; connectivum valde incrassatum; antherae introrsae, longitudinaliter dehiscentes; loculi paralleli. Ovarii rudimentum parvum evolutum, cum basi filamentorum connatum." In *Sphaerostylis* the stamens are said to be: "Stamina 3, alternisepala; filamenta fere nulla, in columnam connata; antherae in summa columna erectae, demum subreflexae, apiculatae; loculi introrsum contigui, paralleli, longitudinaliter dehiscentes. Ovarii rudimentum nullum." The presence of a pistillode, of course, is scarcely of significance in this tribe, because in the type-species of *Tragia* itself, *T. volubilis* L., the pistillode appears as: "Ovarii rudimentum nanum vel nullum" (see Pax & Hoffmann, op. cit., 48). In brief, since *Sphaerostylis* is based upon a plant from Madagascar, and the three species brought under *Tragiella* by Pax & Hoffmann range from South Africa to British East Africa, it may not be doubted that *Tragiella* is correctly treated as a synonym of *Sphaerostylis*, with which it agrees both in characters and in range. *Megistostigma*, which Pax & Hoffmann have reduced to *Sphaerostylis*, differs from this genus at least in respect to its range, to its more or less applanate ♂ perianths, to the entire lobes in its ♀ perianth. *Clavistylus*, which Pax & Hoffmann treat as a valid genus, with the note (op. cit., 104): "Genus certissime affine est *Cnesmonae*, sed non stimulosum; insuper differt disco ♂ evoluta, stylis foliisque peltatis," has much less to do with *Cnesmone* than with *Megistostigma*. Smith himself (in Meded. Dep. Landb. 10: 517. 1910) remarks that *Clavistylus* shares with *Megistostigma* the unisexual inflorescence and the characteristic disc of the ♂ flower, together with the thick columnar style. The difference between these two genera, Smith concludes, is that *Clavistylus* has peltate leaves, appendaged anthers, a 3-partite ♀ calyx and a style connate more extensively toward the apex. None of these differences has generic significance, and the new species described in the present contribution, based upon the Wang collections from Yunnan, is intermediate in its characters between the type-species of both *Megistostigma* and *Clavistylus*. It might be suspected that Pax & Hoffmann have not fully grasped the distribution and the morphology of these genera. They assume that *Cnesmone* has no disc, which is not the case. They bring together two monotypic genera based upon species endemic, re-

spectively, in Madagascar and in Malaysia which is certainly unnecessary. In addition, they publish a new genus for three African species which are manifestly allied with the holotype of *Sphaerostylis*, and accept the validity of a Malaysian monotypic genus, *Clavistylus*, which cannot be extricated from *Megistostigma*. I incline to retain two genera which are undoubtedly allied, but are distinct by their ranges and details of morphology. These genera are: *Sphaerostylis* (Syn. nov.: *Tragiella*), which belongs to Eastern Africa, and *Megistostigma* (Syn. nov.: *Clavistylus*), which is endemic in Malaysia and S. W. China.

No material is available here of the three species of *Tragia* described for the flora of the Philippine Islands, *T. irritans* Merr., *T. luzoniensis* Merr. and *T. philippinensis* Merr., and it is impossible to place them on the basis of the descriptions. Pax & Hoffmann (op. cit., 108) treat *T. irritans* as *Pachystylidium hirsutum* (Bl.) Pax & Hoffm. var. β *irritans* (Merr.) Pax & Hoffm., and describe the anthers of the binomial as: "Sessiles, subhorizontales, dorsifixae, extrorsae," adding that the styles are: "In columnam crassam, late conicam connati." The peculiar position of the anthers would seem to be due to their being more or less versatile upon a very short filament, which accounts for their being seen at the same time as sessile, subhorizontal and extrorse. All these plants may as yet be found to fall within the generic limits of *Cnesmone*.

The holotypes must be seen to dispose of *Cnesmone subpeltata* Ridl., *Tragia laevis* Ridl. and *Cnesmone glabrata* Kurz. The ♀ flower of *C. subpeltata* is unknown (see Ridley in Kew Bull., 368. 1923, and Fl. Malay Penins. 3: 307. 1924), but the note: "Anther-cells separated by a wide connective keeled on both sides and prolonged to a short point" fits the stamens of *Megistostigma malaccense* in so precise a manner as to suggest that Ridley's binomial is a synonym of that species. The leaves of *M. malaccense* are not essentially peltate or even subpeltate, but their venation is pinnately triplinerved, and this venation frequently yields subpeltate foliage in the Euphorbiaceae. *Tragia laevis* is said by Ridley (in Kew Bull., 368. 1923 and Fl. Malay Penins. 3: 308. 1924) to have: "disc large circular papillose. Stamens 3, filaments short thick, as long as disc; anther cells 2 separated on a broad thick connective . . . style stout short with 3 fleshy arms with thick papillae on the upper face." These are certainly not the characters of a species of *Tragia* but I may not say whether *Cnesmone* or *Megistostigma* is involved. The key of Pax & Hoffmann (op. cit., 10) would point to the latter (as *Clavistylus*), which is supposedly distinct from *Cnesmone* on account of its having: "Discus ♂ evolutus." Unfortunately, the ♂ flower of certain species of *Cnesmone* has as large and as well formed an annulus as that of *Megistostigma*.

Pax & Hoffmann refer to *Cnesmone glabrata* Kurz as follows (op. cit., 103 *Nota* 2): "A nobis non visa et ab auctoribus omissa, verosimiliter a *C. javanica* vix diversa est." Ridley reduces it to *Megistostigma malaccense* (Ridley's *Sphaerostylis malaccensis*) on the strength of the description, but fails to effect the combination under *Sphaerostylis*, which is required by Art. 54 of the Rules of Nomenclature. Such a combination, *Sphaerostylis glabrata* (Kurz) Merr., is effected in the Papers Mich. Acad. Sc. Bot. **24**: 78. 1938, with *M. malaccense* in synonymy. Kurz's own description does not seem to bear out these dispositions. Kurz (in *Flora* **58**: 32. 1875) says: "Calycis lacinae lineari-oblongae, acuminatae, sparse puberulae, fimbriatae, 2 lin. circiter longae, subinde in dentem unum alterumve productae." Despite the added note: "Ovarium . . . stigmatate glaberrimo magno campanulato-cuneato terminato," this description excludes *Megistostigma malaccense*, which (see Hook. Icon. **16**: *pl.* 1592. 1887) has entire calyx-lobes. *Cnesmone glabrata* is a *nomen dubium* on the face of the publication, which is to be rejected under the Rules (see Art. 63 and Rec. XXXVII) until such time as the holotype becomes available for certification.

The single species of *Plukenetia* endemic in eastern tropical Asia, *P. corniculata* Sm., is placed by Pax & Hoffmann (op. cit., 22) under *Pterococcus* Hassk., together with two other African endemics, *P. africanus* (Sond.) Pax & Hoffm. and *P. procumbens* (Prain) Pax & Hoffm. Still another genus, *Angostylidium* (Muell. Arg.) Pax & Hoffm., is used by the two authors (op. cit., 17) for *Plukenetia conophora* Muell. Arg., which ranges in tropical western Africa. It may be suspected that this arrangement is not free from the same misconceptions that have suggested the publication of *Tragiella* and the reduction of *Megistostigma* under *Sphaerostylis*. I cannot find characters to separate *Pterococcus* from *Plukenetia*, and agree more than readily with Pax & Hoffmann that *Angostylidium*: "A *Plukenetia* paulo distat." The winged ovary which Pax & Hoffmann (op. cit. 9-10) emphasize in their key to separate *Pterococcus* from *Plukenetia* occurs not only in both genera, but *Plukenetia volubilis* L., which is the *species lectotypica proposita* of the Linnean genus, has a capsule that has winged cocci like *Pterococcus*.

In conclusion, and so far as I know at the present, the PLUKENETIINAE of eastern tropical Asia are distributed as follows:

(1) — *Tragia* L. — The easternmost representative of the genus is said to be *T. novae-hollandiae* Muell. Arg., endemic in Australia, which I have not seen. *Tragia Delphyana* Gagnep. is represented in our herbarium by collections made in Laos and in the Valley of the Mekong,

in French Indo-China. In India proper several species are known, one of which, *T. involucrata* L., appears to be the parent-form of several lesser segregates. In the anthers of *T. involucrata* the connective tends to be thicker than is usual in the genus, and the dehiscence may be introrse. However, *T. bicolor* Miq., which is near *T. involucrata* and like it is endemic in India, has thin filaments and small anthers that dehisce laterally and have no appendages. It seems well established that the Indian species are closely related to those of Africa. *Tragia*, consequently, enters the flora of tropical Asia to a small extent, as an overflow, as it were, of the large African complex under the genus.

(2) — *Cnesmone* Bl. (*Cenesmon* Gagnep., Syn. Nov.; *Tragia* auct. Non L.) — The great majority of the Euphorbiaceae of the Tribe PLUKENETIINAE endemic in tropical Asia and Malaysia belong to this genus. Technically, the anthers' structure, involving the presence of an appendage between the cells, is the generic character. The range extends from Yunnan, in S. W. China, to Malaysia.

(3) — *Megistostigma* Hook f. (*Clavistylus* J. J. Sm., Syn. nov.; *Sphaerostylis* auct. Non Baill.; ? *Tragia* auct. Non L.; ? *Cnesmone* auct. Non Bl.) — Close to *Sphaerostylis* Baill. (*Tragiella* Pax & Hoffm., Syn. nov.), which differs in range (Madagascar, east tropical Africa) and in structural details of the perianth, lobes and anthers. Reported, so far, in S. W. China (*M. yunnanense* Croiz. sp. nov.), in Malaya proper (*M. malaccense* Hook f.) and in the Sunda (*M. peltatum* (J. J. Sm.) Croiz. comb. nov.).

(4) — *Plukenetia* L. (*Pterococcus* Hassk.) — A nearly pandemic genus of less than 12 species ranging from America to eastern Asia through tropical Africa. Represented in Asia by one widespread species, *P. corniculata* Sm., with distribution N. E. India to eastern Malaysia.

These four genera can be keyed as follows:

Anthers numerous, fruit more or less winged. *Plukenetia* L.
Anthers (2-)3, fruit not winged.

Filaments not forming an appendage beyond the anthers, usually thin;
styles spreading. *Tragia* L.

Filaments forming an appendage beyond the anthers, thick.

Stamens more or less triangular, apically dehiscing by a slit; styles
thickened, more or less extensively connate or fused.
. *Megistostigma* Hook. f.

Stamens ligulate to subclavate, with a manifest connective between
the anther-cells, dehiscing laterally or introrsely; styles free or
weakly connate. *Cnesmone* Bl.

Plukenetia L.

Plukenetia corniculata Sm. in Nov. Act. Upsal. **6**: 4. 1799; Muell. Arg. in DC. Prodr. **15**[2]: 772. 1866; Hook. f., Fl. Brit. Ind. **5**: 464. 1887; J. J. Sm. in Meded. Dept. Landb. **10**: 526. 1910; Merr. in Philip. Jour. Sc. **16**: 564. 1920, Enum. Philip. Fl. Pl. **2**: 447. 1923.

Pterococcus corniculatus (Sm.) Pax & Hoffm. in Pflanzenr. 68 [IV. 147. IX–XI]: 22. 1919; Merr. in Papers Mich. Acad. Sc. **24**: 78. 1938.

Pterococcus glaberrimus Hassk. in Flora **25**, Beibl. 41, 2: 41. 1842; Ridl., Fl. Malay Penins. **3**: 309. 1924.

SPECIMENS SEEN:¹ *Rahmat Si Boeea* 7593 & 7827, east coast of Sumatra, 1935.

As noticed by Mansfeld (Kew Bull. 454. 1935) and by Merrill, *Pterococcus* Hassk. (1842) is a later homonym of *Pterococcus* Pallas (1776). Hasskarl's name is not worthy of being proposed as a *nomen conservandum*. The material seen strongly suggests at first sight a subherbaceous form of *Acalypha* L. The ♂ perianth is 4-partite, small, and has many stamens.

Tragia L.

Tragia Delpyana Gagnep. in Bull. Soc. Bot. France **71**: 1027. 1924, in Lecomte, Fl. Gén. Indo-Ch. **5**: 393. 1926.

SPECIMENS SEEN: *Thorel* 2205, Laos [isotype]; *Pierre* s.n., Cochinchina [isosyntyte]; *Harmand*, delta of the Mekong.

This is the only authentic species of *Tragia* known to me east of India. The two subsessile stamens are very characteristic.

Megistostigma Hook f.

Megistostigma malaccense Hook. f. in Icon. **16**: pl. 1592. 1887, Fl. Brit. Ind. **5**: 467. 1888.

Sphaerostylis malaccensis Pax & Hoffm. in Pflanzenr. 68 [IV. 147. IX–XI]: 31, fig. 11 E, F–107. 1919; Ridl. Fl. Malay Penins. **3**: 308. 1924.

Sphaerostylis glabrata Merr. in Papers Mich. Acad. Sc. Bot., **24**: 78. 1938 [quoad specimina Sumatrana. An: *Cnesmone glabrata* Kurz?].

SPECIMENS SEEN: *Rahmat Si Boeea* 7186, 8780, 9864, east coast of Sumatra, 1935; *Rahmat Si Toroës* 1389, east coast of Sumatra, 1928.

Hooker's type-illustration is good, although the anthers it shows are

¹All the specimens cited belong to the herbarium of the Arnold Arboretum of Harvard University.

apparently immature. The species is very easily confused at first sight with a narrow-leaved form of *Mallotus* or *Macaranga*.

Megistostigma peltatum (J. J. Sm.) Croiz. comb. nov.

Clavistylus peltatus J. J. Sm. in Meded. Dept. Landb. **10**: 517. 1910; Koord., Excurs. Fl. Java **2**: 498. 1912; van Steen. in Bull. Jard. Bot. Buitenz. iii. **12**: 201, fig. 10. 1932; Pax & Hoffm. in Pflanzenr. 68 [IV. **147**. IX–XI]: 104. 1919.

I have not seen specimens, but the illustrations and the careful critical notes of van Steenis, together with the descriptions and the remarks of Smith and Pax & Hoffmann, leave no doubt as to the true position of *Clavistylus*. As previously stated, *M. yunnanense* has characters which are intermediates between those of *M. malaccense* and *M. peltatum*.

Megistostigma cordatum Merr. in Philip. Jour. Sc. **16**: 563. 1920, Enum. Philip. Fl. Pl. **2**: 446. 1923.

I have seen no material of this species. The description points to a peculiar form for the genus, as it speaks of: "Style pubescent, 2 to 3 mm. long; stigma subglobose, obscurely 3-lobed, glabrous, fleshy, about 6 mm. in diameter."

Megistostigma yunnanense Croiz. sp. nov.

Frutex scandens, primo intuito *Phaseoli* vel *Dolichi* specimen, ni folia obstarent simplicia, habitu optime mentiens. Caulibus teretibus, striatis, pallidis, sublignosis, sub apicem parcius setulosis, stipulis triangulari-lanceolatis ad 1 cm. longis, brunneis, integris, conspicuis ad basem petiolorum insignitis. Foliis cordatis, plus minusve ellipticis vel obovatis, breviter abrupteque caudatis, integerrimis, nervis utrinque 3–4 adscendentibus, pilis adpressis simplicibus hinc inde obsitis, lamina caeterum glabrescente vel glabra, 12–16 cm. longa, 7–14 cm. lata, [laminis interdum minimis 5 cm. longis, 2 cm. latis], petiolo herbaceo, eglanduloso, sat gracili, parcius pubescente, 4–14 cm. longo. Floribus in cymulis 2-sexualibus congregatis [an semper?], ♂ ca. 7 mm. magnis, perianthio fere ad basem in lobos 3 integros, triangulares, eglandulosos partito, lobis ca. 3 mm. magnis; staminibus 3, triangularibus, carnosulis, processo in medio breviter producto, rima apicaliter dehiscentibus, ca. 1 mm. longis, 1.5 mm. latis, in stipite brevissime insidentibus, more generis annulo haud carnosus, nempe perianthio ipso grosse plicato-rugoso, circumdatis, pistillodio nullo [an semper?]. Floribus ♀ in axillis bractearum foliaceo-subpetaloides latiusculis orientibus, perianthio in lobos 5 partito, 6 mm. longos, 2 mm. latos, integerrimos, lanceolato-

ovatos, petaloideos, venosos; ovario depresso-globuloso, albicante hispidulo, ca. 2 mm. magno, stylis in columnam coalitis, apice subimpresso-partitis [sic immaturis tantum?], grosse clavatis, glaberrimis, 5 mm. longis, 4 mm. latis. Caetera desiderantur.

YUNNAN: *Wang* 75870, Sheau-meng-yeang, Cheli, alt. 1100 m., "vine on mountain slope, woods," Sept. 1936 [♂ spec. — *Holotypus*]; *Wang* 74861, Fo-Hai, alt. 1300 m., "in woods," June 1936 [♀ spec.].

The anthers perfectly match those shown by van Steenis in *M. peltatum* (*Clavistylus peltatus*). In every detail of its gross morphology but the simple leaves, the new species simulates vines of the Leguminosae family. The genus is new for the flora of China, and is likely to turn up in Indochina, where so far it has not been recorded.

Cnesmone Bl.

Cnesmone javanica Bl., *Bijdr.* **12**: 630. 1825 [as *Cnesmosa*, sphalm.]; Bl. & Fisch., *Fl. Jav.* **1**: vi *in nota* [Blume emend., *Cnesmone*]; Baill. *Et. Gén. Euphorb.* 458, *pl.* 4, *fig.* 14–17. 1858; Muell. Arg. in DC. *Prodr.* **15**[2]: 926. 1866; J. J. Sm. in *Meded. Dept. Landb.* **10**: 513. 1910; Pax & Hoffm. in *Pflanzenr.* 68 [IV. **147.** IX–XI]: 102. 1919; Ridl., *Fl. Malay Penins.* **3**: 306. 1924; Gagnep. in Lecomte, *Fl. Gén. Indo-Ch.* **5**: 385. 1926; Merr. in *Univ. Calif. Publ. Bot.*, **15**: 161. 1929.

SPECIMENS SEEN: *J. D. H. & T. T.*, Khasia; *Pierre*, Indochina; *For. Res. Inst. Dehra Dun* 15094, Burma; *Elmer* 20663, Borneo; *Brinkman* 658, Java.

This species is hardly better understood today than it was one century ago. Ridley published *C. subpeltata* which, as previously noticed, cannot be identified from description and may be merely a leaf-form of Blume's species. The material seen from Khasia is very close to *C. tonkinensis*, a specimen of which, *Balansa* 3259 [fragm. in herb. Arnold Arb.], has been determined by Pax & Hoffmann (op. cit., 102) as *C. javanica*. The ♀ perianth is 6-lobed in *C. tonkinensis* and *C. anisosepala* and 3-lobed in *C. javanica*. However, three of the lobes of the perianth of the species first mentioned are much smaller than the others with which they alternate, and it seems altogether likely that the typical 3-lobed perianth of *C. javanica* is derived from the 6-lobed perianth of *C. tonkinensis* and *C. anisosepala* by abortion of the inner floral whorl [= petals]. On the cited *Pierre* specimen, which I may not dissect, there is one ♀ perianth in which the relic of a lobule would seem to appear between two normally developed lobes.

Cnesmone laotica (Gagnep.) Croiz. comb. nov.

Cenesmon laoticum Gagnep. in Bull. Soc. Bot. France **71**: 867. 1924, in Lecomte, Fl. Gén. Indo-Chin. **5**: 390. 1926.

SPECIMENS SEEN: *Thorel*; *Harmand* [Godefroy], Indochina.

Gagnepain describes six sepals in the perianth of this species, three of which are much smaller. Better collection may prove that *C. laotica* falls within the specific limits of *C. tonkinensis* or *C. anisosepala*.

Cnesmone linearis (Gagnep.) Croiz. comb. nov.

Cenesmon lineare Gagnep. in Bull. Soc. Bot. France **71**: 867. 1924; in Lecomte, Fl. Gén. Indo-Chin. **5**: 389. 1926.

SPECIMENS SEEN: *Thorel*, Indochina.

This, too, may prove to be an extreme form of the *C. tonkinensis* - *C. anisosepala* complex, with very narrow leaves.

Cnesmone peltata (Gagnep.) Croiz. comb. nov.

Cenesmon peltatum Gagnep. in Bull. Soc. Bot. France **71**: 868. 1924; in Lecomte, Fl. Gén. Indo-Chin. **5**: 392. 1926.

SPECIMENS SEEN: *Poilane* 5493 & 8349, Indochina.

Poilane 8349 has a gross morphology that is strongly reminiscent of *Megistostigma*, and this is probably the material that has prompted Gagnepain (in Bull. Soc. Bot. France **71**: 866. 1924) to remark that one of the species of *Cenesmon* is close to *Clavistylus*. The holotype of the species, *Poilane* 5493, however, does not suggest *Clavistylus* and agrees with the gross morphology of *Cnesmone*. I may not say whether these differences are merely the result of individual variations, because the material I have at hand is sterile. Gagnepain's description of the flowers points to *Cnesmone*, witness the characterization of the style as having: "Stigmata 3, lanceolata, valde patentia, tenuia, 3 mm. longa, 1.5 mm. lata, supra papillis conicis majusculis marginantibus tecta."

Cnesmone Poilanei (Gagnep.) Croiz. comb. nov.

Cenesmon Poilanei Gagnep. in Bull. Soc. Bot. France **71**: 869. 1924; in Lecomte, Fl. Gén. Indo-Chin. **5**: 387. 1926.

SPECIMEN SEEN: *Poilane* 2862, Indochina.

The anthers are those of *Cnesmone*. Although near to small-leaved forms of *C. javanica* and *C. tonkinensis*, this species is likely to prove distinct. The *locus classicus* is the Island of Tré, near Nhatrang, Annam, which is rich in peculiar endemics characterized by small, often distinctly sclerophyllous types of foliage.

Cnesmone tonkinensis (Gagnep.) Croiz. comb. nov.

Cenesmon tonkinense Gagnep. in Bull. Soc. Bot. France 71: 869. 1924;
in Lecomte, Fl. Gén. Indo-Chin. 5: 389. 1926.

SPECIMENS SEEN: *Bon 5810*, Indochina; *Balansa 3259*, Indochina;
Pételot 6520 & 6521, Indochina.

It is difficult to distinguish at sight this species from *C. javanica*, which it matches in every detail of its gross morphology. The ♀ perianth has six lobes, three of which are much smaller. In *C. javanica* the ♀ perianth has only three lobes, suggesting a reduction from the perianth of *C. tonkinensis*. It is probable that intermediates between these two species will be found, with three subabortive lobes. Good material is needed which is now not available.

Cnesmone Mairei (Léveillé) Croiz. comb. nov.

Alchornea Mairei Léveillé Catal. Pl. Yun-nan 94. 1916.

SPECIMEN SEEN: *Maire s.n.*, Yunnan.

The nomenclature of this species is altogether confusing. Léveillé published it under *Alchornea* in 1916, basing it upon an unnumbered collection of Maire from the "Vallon de You-fong-kéou" in Yunnan. Handel-Mazzetti mistakenly identified Maire's material as a variety of *Tragia involucrata* L. (Symb. Sin. 7: 218. 1931), which is a very different plant. Rehder accepted Handel-Mazzetti's misdetermination at first (in Jour. Arnold Arb. 14: 234. 1933), but later decided it was a distinct species and effected the combination *Tragia Mairei* (Léveillé) Rehd. (in Jour. Arnold Arb. 18: 214. 1937). While this was going on, Gagnepain found the Maire collection still unnamed in the Paris herbarium and based upon it *Cenesmon Mairei* Gagnep. (in Bull. Soc. Bot. France 71: 868. 1924; in Lecomte, Fl. Gén. Indo-Chin. 5: 391. 1926). Thus the same collection was independently used to publish a species under *Alchornea* and under *Cenesmon*, the same specific epithet being chosen by coincidence by Léveillé and by Gagnepain. A good fragment of the holotype of Gagnepain's binomial is in our herbarium. I have dissected its flowers and I am certain that *Cnesmone* and not *Tragia* is involved. The ♂ perianth has the very conspicuous annulus that is mistakenly believed to be characteristic of the flower of *Megistostigma* and not of that of *Cnesmone*.

Cnesmone anisosepala (Merr. & Chun) Croiz. comb. nov.

Tragia anisosepala Merr. & Chun in Sunyatsenia 2: 261. 1935.

Tragia involucrata Merr. [*fide ipsius*] in Lingn. Jour. Sci. 5: 111. 1927.
Non L.

SPECIMEN SEEN: *Lau 141*, Hainan.

The connective between the anther-cells is well-developed and the annulus is manifest. Further critical comparison with *C. tonkinensis* is desirable.

Cnesmone hainanensis (Merr. & Chun) Croiz. comb. nov.

Cnesmon hainanense Merr. & Chun in Sunyatsenia 5: 94. 1940.

SPECIMEN SEEN: *How 73926*, Hainan.

The ♂ flowers are lacking, but the holotype, which is the single collection so far known, suggests *Cnesmone*, and it is quite unlikely that it may prove to belong to *Tragia*. As remarked in the original publication, *C. hainanensis* resembles *Poilane 5493*, holotype of *C. peltata*. The true affinities of this interesting species are still obscure.

Sphaerostylis Baill.

To dispose of the troublesome synonymy created by the reduction of *Megistostigma* to *Sphaerostylis*, and to reestablish the limits in this group of genera, the following new combinations and listings are required:

Sphaerostylis natalensis (Sond.) Croiz. comb. nov.

Tragia natalensis Sond. in Linnaea 23: 107. 1850; Muell. Arg. in DC. Prodr. 15[2]: 942. 1866; Prain in Dyer, Fl. Trop. Afr. 6[1]: 974. 1913.

Tragiella natalensis (Sond.) Pax & Hoffm. in Pflanzenr. 68 [IV. 147. IX-XI]: 105, fig. 24, A-E. 1919.

Sphaerostylis anomala (Prain) Croiz. comb. nov.

Tragia anomala Prain in Kew Bull. 194. 1912; in Dyer, Fl. Trop. Afr. 6[1]: 975. 1913.

Tragiella anomala (Prain) Pax & Hoffm. in Pflanzenr. 68 [IV. 147. IX-XI]: 106, fig. 24, F. 1919.

Sphaerostylis Frieseana (Prain) Croiz. comb. nov.

Tragia Frieseana Prain in Wissensch. Ergeb. Schwed. Rhodesia-Kongo Exped. 125. 1914.

Tragiella Frieseana (Prain) Pax & Hoffm. in Pflanzenr. 68 [IV. 147. IX-XI]: 106. 1919.

Prain has reduced *Sphaerostylis* to *Tragia*, apparently granting to Baillon's genus a subgeneric or sectional rank (in Dyer, Fl. Trop. Afr. 6[1]: 976. 1913) under the cryptic listing: "*Tragia (Sphaerostylis) Tulasneana*." I cannot follow him, because the concept of generic limits he adopts in this tribe would tend to bring all its genera under *Tragia*.

Ramelia Baill.

Ramelia codonostylis Baill. in Adans. **11**: 132. 1874; Benth. in Benth. & Hook. Gen. Plant. **3**: 326. 1880; Guillaum. in Lecomte Not. Syst. **2**: 376. 1913; in Arch. Bot. Caen **2**[3]: 40. 1929; Pax & Hoffm. in Pflanzenr. 68 [IV. **147**. IX–XI]: 108. 1919.

I have not seen material of this rare shrub, which is strictly localized in New Caledonia, and, according to Guillaumin, is synonymous with *Cleidion platystygma* Schlecht. (in Bot. Jahrb. **39**: 150. 1907). The lobes of the ♀ calyx form two series, as in *Cnesmone*, but the habit is not that of a climber. *Ramelia*, consequently, is not the same genus as *Cnesmone* or *Megistostigma*. Its phylogenetic significance is still unknown, and it may prove to be an ancestral form to both *Sphaerostylis* and *Megistostigma*. It is certainly a very primitive form.

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THE COMPARATIVE MORPHOLOGY OF THE ICACINACEAE
III. IMPERFORATE TRACHEARY ELEMENTS AND
XYLEM PARENCHYMA

I. W. BAILEY AND R. A. HOWARD

With three plates

WE HAVE shown in the second paper of this series (3) that there are salient irreversible trends of structural specialization in the vessels of the Icacinaceae which parallel those that occur in other families of the dicotyledons. These lines of phylogenetic modification are more or less closely synchronized and may be utilized in differentiating the Icacinoideae into successive levels of increasing structural modification.

Bailey and Tupper (2) and Kribs (6) have demonstrated by statistical analyses of the dicotyledons as a whole that there are clearly defined trends of evolutionary changes in the imperforate tracheary elements and the wood parenchyma of the secondary xylem. Although these cells tend in general to become more and more extensively modified with increasing specialization of the cambium and vessels, the rates of the various phylogenetic changes are not the same in all cases. Thus, in a specific family, the modification of the imperforate tracheary elements or of the wood parenchyma may run ahead of or lag behind that of the vessels. It is of interest, accordingly, to study the types of imperforate tracheary elements and of xylem parenchyma that occur in the three major categories of the Icacinoideae which were differentiated in the second paper of this series.

IMPERFORATE TRACHEARY ELEMENTS

The length of the vessel members in the secondary xylem of dicotyledons is determined primarily by the length of the fusiform initials in the cambium. The elongation or contraction of the vessel members during tissue differentiation is so slight in most cases as to be statistically negligible, Bailey (1). On the contrary, the diameters and the cross-sectional area of the vessels are determined largely by the lateral expansion of the vessel members during tissue differentiation. The imperforate tracheary elements of the secondary xylem commonly elongate